BRITISH COLUMBIA SALMON FARMERS ASSOCIATION

CODES OF PRACTICE
FOR THE
HUSBANDRY AND WELFARE
OF
FARMED FISH

in co-operation with the
Aquaculture and Commercial Fisheries Branch
Ministry of Agriculture and Fisheries
Province of British Columbia

Second Edition
November 1988

BC
Ministry of Agriculture and Fisheries

B.C.
SALMON FARMERS ASSOCIATION

Canadian Cataloguing in Publication Data

Parkinson, Anne, 1953-

Codes of practice for the husbandry and welfare of farmed fish

Anne Parkinson ... provided the written material and served as editor. Cf. Pref.

Co-published by British Columbia Salmon Farmers Association.

ISBN 0-7718-8663-2

1. Salmon. 2. Fish-culture - British Columbia. I. B.C. Salmon Farmers Association. II. British Columbia. Aquaculture and Commercial Fisheries Branch. III. Title.

SH167.S17P35 1988 639.3'755 C88-092138-2

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PREFACE

Since its incorporation in July 1984, the B.C. Salmon Farmers Association has grown at least as quickly as the salmon farming industry itself.

The number of programs and services developed for and delivered to members has doubled every year, a growth rate that shows no signs of abating.

BCSFA views these "Codes of Practice" as a meaningful beginning to the establishment of the highest possible standards of husbandry and conduct in B.C.'s salmon farming industry.

The industry is new and growing rapidly. Much is still to be learned about rearing salmon and about cooperative use of B.C.'s vast coastal resource. BCSFA and its members are committed to achieving excellence in both areas.

This document was reviewed within government. Anne Parkinson, Aquaculture and Commercial Fisheries Branch, Ministry of Agriculture and Fisheries, provided the written material and served as editor.

INTRODUCTION

Codes of Practice are intended to encourage aquaculturists to adopt the highest standards of husbandry. These Codes are modelled after "Codes of Recommendations for the Husbandry and Welfare of Farmed Fish" by the National Farmers' Union of Scotland, but rewritten in the context of the British Columbia industry.

The purposes of the Codes are:

- to reach existing and prospective fish farmers and ensure that the best procedures are followed to produce the high quality product necessary to maintain British Columbia farmed salmon markets.

- to ensure that salmon farms are operating in a manner acceptable to the public to maintain a good balance with the community and the environment surrounding farms.

- to set effective guidelines for salmon farmers regarding waste disposal, predator control, farm safety and any future issues as they arise.

The Codes are established as a guideline although some points are highlighted (*) where Federal, Provincial and Municipal regulations apply. Fish farmers are bound by the conditions of the Crown Land lease and are responsible for ensuring that their farms are in full compliance.

The basic requirements for the welfare of all livestock is a husbandry system which provides:

i) nutritionally adequate feed;
ii) a suitable environment;
iii) space for adequate freedom of movement;
iv) access for satisfactory inspection;
v) rapid diagnosis and treatment of injury, disease or infestation;
vi) a minimum of disturbances to the fish stocks.

The Codes identify those features of fish husbandry where the welfare of the stock could be at risk unless certain precautions are taken, and sets out in broad terms what those precautions should be, bearing in mind the importance of the total environment of the stock. Since there is usually more than one way in which the welfare of fish can be safeguarded, the Codes include specific requirements only where there is clear evidence that no other treatment will alleviate the condition. The document is not intended to be a step-by-step approach to farming.

The Codes emphasize the prime importance of good husbandry, because husbandry is the key factor in the welfare of all livestock. Good husbandry minimizes disease, increases productivity and profitability and is in the overall best interest of the fish farmer. The recommendations are designed to help the aquaculturists to ensure that the well-being of the fish is fully safeguarded.

Fish farming in British Columbia is expanding rapidly and the Codes of Practice will be updated periodically to ensure that guidelines are current.

SUMMARY OF THE TEXT

The welfare of farmed fish can be safeguarded under a variety of management systems. The Codes outline the many areas of concern to a fish farmer. By adhering to the following Codes, individual farmers will contribute to the well-being of the industry in the marketplace as well as in the public eye.

The first section of the text covers the Codes relating to installations, mechanical equipment, and equipment servicing. Consideration should be given to the question of fish welfare previously used. Thus, systems involving a high degree of control over the environment, such as on-land operations, should only be installed where conscientious staff, skilled in both husbandry and the use of the equipment will always be available.

The next sections cover water quality, stocking densities, and feeding, which are crucial to disease prevention. Although very large stocks can be managed successfully, in general, the larger the size of the unit, the greater the degree of skill and conscientiousness needed to safeguard welfare. The size of a unit should not be increased nor should a large unit be set up unless the fish farmer in charge will be able to manage the welfare of the fish and understand the environment in which they live.

Stress increases the susceptibility of the fish to disease. Signs which, taken together, indicate good health in the stock are set out. A good fish farmer will be able to recognize distress or disease in its earliest stages and may often be able to identify the cause and put matters right immediately. It is important for management purposes that fish farmers should have ample time daily to check stock and inspect equipment. However, if the cause of a problem is not obvious, or if the fish farmer's immediate action is not effective, expert advice should be obtained as soon as possible. Ailing fish or any fish suffering from injury should be treated and wherever possible, segregated, or should if necessary, be humanely culled.

Harvesting is a topic to be covered more thoroughly in the future as is farm safety as both are presently undergoing revisions in legislation.

The species of fish cultivated in British Columbia are sensitive to pollution. It is of primary importance to the farmer to recognize the inter-relationship between the welfare of the stocks and the maintenance of the environment.

It is important that a fish farmer consider the environment and the community needs around the farm and establish good public relations on the coast.

The last section of the text contains lists of contact agencies, training centres and further information to which farmers can refer.

SYMBOLS USED IN THE TEXT

* = Federal/Provincial/Municipal regulations apply.

(See Aquaculture Information Bulletin #) = see bulletins listed on page 9 for further information.

CODES OF PRACTICE FOR THE HUSBANDRY AND WELFARE OF FARMED FISH

1. SITING AND PRIMARY INSTALLATIONS

.1* The success of a fish farm is largely dependent on the suitability of the marine site. The site must meet the physical and biological requirements of the culture species, as well as the requirements of a net cage rearing operation. The size of the farm should be carefully considered for the site. The Ministry of Forests and Lands is responsible for issuing leases for Crown Land. Information packages on site selection are available from the Ministry of Forests and Lands. Staff at the Ministry of Agriculture and Fisheries are available to assist farmers with the technical aspects of site selection. (See Aquaculture Information Bulletin # 10).

.2 Heating, lighting, feed, oxygenation, water and waste control equipment must be designed, sited and installed so as to avoid risk of injuring the fish and employees.

.3 When planning new buildings, construction materials with a high fire resistance and proper electrical installations must be used so as to minimize the fire risk. Particular care should be exercised by staff in the installation of electrical equipment in proximity to water.

.4 Metals, paints, antifoulants and wood preservatives, which may be toxic, must not be used on surfaces accessible to the fish, or if applied, then sufficient time and suitable conditions should be allowed to enable any toxic effects to be removed, such as by air drying, exposure to sunlight, and steam cleaning.

.5 Internal surfaces of containers must be made of materials which can be effectively cleansed and disinfected, and should be designed, constructed and maintained so as to avoid injury or distress to the fish. Consideration should be given to surface color, texture and shape of containers which, as technology progresses, may prove to be important in the welfare of the fish.

.6 The type and arrangement of cages/tanks must allow for efficient working and for each batch of fish to be properly inspected.

.7 Adequate space must be provided in relation to the age, size and class of stock.

.8 Inlet and outlet screens, and cages, must be constructed and maintained to prevent fish escaping to any settlement ponds, to avoid the escape of farmed fish. Screens must also stop the introduction of wild fish into the farm.

.9" Adequate protection must be taken to minimize attacks by birds, seals, otters and other animals. Complete or partial exclosure of predators may be necessary. Each farm site must assess its predator problems and take appropriate action. Federal and Provincial legislation prohibits the killing of many wildlife species and Municipal regulations control the use of firearms. (See Aquaculture Information # 9).

2. <u>WATER QUALITY</u>

.1" It is essential to ensure an adequate supply of well-oxygenated water, of good quality with low ammonia and carbon dioxide levels. Water temperatures, dissolved oxygen, salinity and plankton should be monitored regularly. Environmental monitoring is a requirement of the tenure and should serve the purpose of good farm management as well as environmental protection.

.2" All Federal, Provincial and Municipal regulations are to be followed concerning any situation which may be a potential water quality problem.

a. The accumulation of excreta and feed waste in ponds, tanks or beneath cages can lead to a production of noxious gases. It is in the interest of fish welfare, and thus the farmer, that regular steps be taken to avoid this situation.

b. The cleansing and removal of waste from tanks or ponds should be performed in a manner to keep pollution to a minimum. Accumulated solids should be removed for safe disposal on land and not put in the water.

c. Antibiotics, antimicrobial compounds and other chemicals used for fish treatments or cleansing must not contaminate water supplies. If used incorrectly, they can be toxic to wildlife and human populations.

.3 Water samples, to detect harmful phytoplankton, should be taken on a regular basis, preferably daily. To report blooms, contact the Plankton Watch Program Coordinator or the B.C. Salmon Farmers Association. A well established plankton reporting system aids all farmers on the coast to avoid blooms which are

potentially lethal to penned fish. (See Aquaculture Information Bulletin # 13).

3. MECHANICAL EQUIPMENT INSTALLATION AND SERVICING

.1" Feeding and water flow equipment, heating and lighting units, alarm systems, fire extinguishers and other devices, should be regularly inspected and kept in good working order. Existing bylaws should be followed.

.2" Where the failure of any mechanical or electrically operated equipment could cause distress to the fish an automatic alarm system is essential to warn of breakdown. Backup equipment generators such as aeration systems, and alternate water systems, should be available at all times.

4. STOCKING DENSITIES

.1 Before pens are stocked, approval must be received from the Federal - Provincial Transplant Committee to move fish. (See Aquaculture Bulletin # 8).

.2 Fish kept under any intensive system are prone to stress, injury and disease, if management and husbandry are not of a high standard. Stocking density is one aspect of a complex situation involving factors such as strain, age, stock size, temperature, water exchange and light intensity. The correct density for any particular farm pen must be based on careful consideration of all factors.

.3 If environmental degradation, disease or stress become evident, by observation or by unsatisfactory growth rates, a reduction in stocking density and/or an improvement in water flow/oxygenation should be considered as the priority measures to be taken.

.4 Counting and grading of fish is an important aspect of determining stocking density and in overall farm management and should be given the time, labour and expense necessary to be properly completed.

5. FEEDING

.1 Whatever feeding system is adopted, all fish should receive a diet which is nutritionally adequate to maintain health. Follow manufacturers' recommendations for feed handling and storage. Avoid over-feeding as this contributes to the waste loading of the farm operation. A feed-fine recovery system should be considered to reduce the immediate effects of fines on the fish, dissolved oxygen in pens and the long-term effects on the environment.

.2 Arrangements should be made in advance to ensure that adequate supplies of feed are available at all times.

.3 The quantity and type of feed used should be such that:

a) There is no possibility of transmission of disease by the feed to the fish.

b) It contains no toxic substance likely to accumulate in fish at levels dangerous to consumers.

c) Where it is medicated, it must be fed at the prescribed level and period.

.4 To avoid spoilage, feed should be properly stored in secure and separate feed buildings or silos which exclude rodents and birds.

6. DISEASE PREVENTION AND CONTROL

.1 Use only eggs and sperm from adults which are free of specific pathogens (e.g. IHN, BKD).

.2 Avoid overcrowding.

.3 Maintain a good standard in all environmental factors; maintain appropriate flow rates and ensure the water is well oxygenated.

.4 Prevent mechanical damage to mucous layer and fins of fish. Avoid excessive or rough handling by mechanical objects or by rubbing against other fish. It is desirable to establish a regular daily work routine to which the fish become accustomed. Care should be taken not be frighten fish with sudden movement or noise. Precautions should be taken to avoid disturbance by predators and disturbances related to predator control.

.5 Do not weaken fish by excessive or unnecessary chemical dips and flushes. Follow veterinary advice.

.6 Frequently inspect stocks. This is essential because the condition and reactions of the fish are the main guides to their welfare. An inspection should be made at least once daily in addition to the looking over which fish receive during routine management work. Trained staff need time to observe fish for early warnings of stress and disease.

.7 Collect dead fish at regular intervals and bury them in quick lime or burn them. Disposal should be done in a manner which does not attract troublesome animals, such

as bears. Dying fish should also be collected at the same time and humanely killed before being similarly burned or buried. Rendering fish to fish meal is a method of disposing of dead fish which is being explored at this time. All dead and dying fish should be treated as a potential disease risk. Follow all Provincial and Municipal regulations.

.8 Avoid unnecessary transfer of water, equipment, and fish to keep low the risk of contamination among batches of fish.

.9 Keep accurate records of mortalities, treatments, feeding activity, temperature of the water and treatment results.

.10 Do not release fish into open waters, except where it is part of a planned re-stocking program, and not without the prior consent of Federal and Provincial governments. (See Aquaculture Information Bulletin # 8).

.11 Check, where possible, that acquired stocks are free of specific diseases before purchase.

.12 Use disinfection to prevent spread of disease to unaffected batches by following these Codes:

a) Disinfect all equipment before introduction to the farm.

b) Take precautions to avoid farm-to-farm spread from vehicles and visitors, etc. Disinfectant wheel and foot baths are advisable and should be renewed frequently and protected from the weather.

c) Wash and disinfect tanks used for transportation between deliveries. Care should be taken to ensure that any water containing disinfectant is not introduced into a water course.

.13 Use competent, trained operators for vaccination or similar procedures. Suitable gloves, masks, and other protective gear must be made available to staff to use when mixing antibiotics in feed or applying vaccines. Care should be taken to avoid unnecessary disturbance of the fish.

.14 Obtain prescription medicines, e.g., antibiotics, only on advice from veterinary sources and use according to the manufacturer's recommendations.

.15* Obtain approval from the Ministry of Environment and Parks, Transplant Committee before fish or eggs are moved from one site to another. (See Aquaculture Information Bulletin # 8).

.16* Site fish processing plants to prevent process wastes from affecting nearby fish. Where this is not possible, care should be taken in the discharge of wastes by the following:

a) Solid wastes should be collected and disposed of other than on site;

b) Liquid wastes should be disposed of by one of the following methods;

i. to a public sewage system which gives at least primary and secondary treatment before discharge;

ii. to a soil or sand soak which is some distance from open waters;

NOTE: Guidelines are being established concerning reportable diseases. The diseases to be reported, the time frame and reporting agency will be included as soon as the appropriate Act revisions have been approved.

7. <u>HARVESTING</u>

*This section is to be expanded as Provincial government legislation and new quality control guidelines are developed.

.1 Carefully observe and implement suitable withdrawal periods for veterinary products prior to harvesting. No chemical treatments should be administered during the starvation period prior to slaughter with the exception of common salt baths.

.2* Comply with any legal requirement for the method of slaughter to be used. Check with the Commercial Fisheries Section of the Ministry of Agriculture and Fisheries.

.3 Starve fish adequately before harvesting. For fish held at temperatures of 8°C and higher, seven days are recommended. At temperatures lower than 8°C, ten days are recommended. For more information on harvesting methods, see Handbook for Handling and Processing A High Quality Fresh Farmed Salmon from the B.C. Salmon Farmers Association.

.4" Do not process fish (such as removal of viscera, head, etc.) on the farm site unless the processing facilities are approved by Federal and Provincial agencies.

8. HARVESTING - FOR SMOLT MARKETS

.1 When oral anti-bacterial treatments are used, the advice of the veterinarian should be strictly adhered to particularly with regard to the dosage and withdrawal prior to placing fish into net pens.

.2 No fish should be delivered from batches showing an abnormal daily mortality over the previous four weeks.

.3 Where fish offered for sale have not been reared on the vending farm, details of previous ownership and dates of movement should be certified by the vendor.

.4 In the case of sales of ova detailed information on the broodstock should be available including:

- age of the fish
- dates on which the eggs in question were stripped
- information on egg size
- information on broodstock screening history
- whether or not the eggs were disinfected and the method used
- estimated date of hatching in degree days
- identity of the site/sites where the brood fish were held

.5 Tanks used for transportation should be washed and disinfected between deliveries. Care should be taken to ensure that any water containing disinfectant is not introduced into a water course. If the transportation water is not wholly from the farm of origin the details of any additional water should be given to the buyer.

9. FARM SAFETY

.1" The B.C. Salmon Farmers Association in conjunction with the B.C. Federation of Agriculture, has established a Farm Safety Committee that is developing detailed safety standards for all member farms. Specifically, all BCSFA members must comply with the Underwater Diving Regulations established by the industry.

10. PUBLIC RELATIONS MANAGEMENT

.1 Fish farmers, as part of a new industry, should establish a "good neighbour" code of practice on their sites which will enhance public acceptance of fish farms. Consideration should be shown in both established communities and less inhabited sites where

recreational activities have been long-standing. Clearly mark the boundaries of a lease.

.2" Fish farmers must recognize the private upland owner's riparian rights to the foreshore and upland and must follow, as a minimum, Provincial regulations and lease requirements to allow public access. As well, access to water adjacent to the sites must comply with Federal Coast Guard regulations.

.3" Noise levels on farms must comply with local by-laws where they exist. In any case, it is the responsibility of the individual fish farmer to keep noise levels to a minimum by muffling generators and reducing other disturbance levels such as predator control devices and radios. Reducing boat speed along with safe boating practices can reduce noise levels and minimize.

.4 Visual impact of fish farms should be considered, as should smell. A clean and organized operation is generally a sign of a healthy, well managed operation and can go a long way to prevent any negative public relations.

.5 The "good neighbour" policy should extend to cover emergency situations where boaters require assistance due to stormy weather or accidents. A fish farmer must use his or her discretion regarding public requests to tour facilities. In areas of high requests, regular tour hours are recommended.

.6" Federal, Provincial and Municipal regulations must be followed and, in less organized areas, it is the responsibility of the fish farmer to be aware of sensitive issues and keep public confrontation to a minimum. This will avoid precipitating the need for additional controls where these would otherwise not be deemed necessary.

11. CONTACT AGENCIES AND TRAINING CENTRES

LEAD AGENCY
Ministry of Agriculture & Fisheries
808 Douglas Street
Victoria, B.C. V8W 2Z7
(604) 356-1600

B.C. Salmon Farmers Association
2459A Bellevue Avenue
West Vancouver, B.C. V7V 1E1
(604) 922-4525

Western Trout Farmers Association
31395 Silverdale Road
Mission, B.C. V2V 4H9
(604) 826-7818 or 826-6471

Sunshine Coast Aquaculture Assoc.
P.O. Box 2360
Sechelt, B.C. V0N 3A0

Malaspina College
Aquaculture Department
900 Fifth Street
Nanaimo, B.C. V9R 5S5
(604) 753-3245

University of B.C.
Animal Science
2357 Main Mall
Vancouver, B.C. V6T 1W5
(604) 228-2565

Canadian Aquaculture Suppliers Association
Box 86267
North Vancouver, B.C. V7L 4K4
(604) 986-7870

Ministry of Environment & Parks
Leif Sunde-Trout Aquaculture
780 Blanshard Street
Victoria, B.C. V8W 2H1
(604) 387-9589

Ministry of Forests and Lands
4000 Seymour Place
Victoria, B.C. V8X 1X4
(604) 387-1807

Aquaculture Association of B.C.
Site 52, Comp. 103
5331 Hammond Bay Road
Nanaimo, B.C. V9V 5N7
(604) 758-2922

North Island Mariculture Assoc.
Box 3
Zeballos, B.C. V0P 2A0

University of Victoria
Biology Department
P.O. Box 1700
Victoria, B.C. V8W 2Y2
(604) 721-7094

North Island College
156 Manor Drive
Comox, B.C. V9N 6P7
(604) 339-5551

North Island College
Aquaculture Department
1480 Elm Street
Campbell River, B.C. V9W 3A6
(604) 286-8911

Capilano College-Sechelt Campus
Aquaculture Resource Center
P.O. Box 1609
Sechelt, B.C. V0N 3A0

B.C. Oyster Growers Association
P.O. Box 7, Parker Road
Nanoose Bay, B.C. V0R 2R0
(604) 468-7059

Dr. Louis Druehl
Institute for Aquaculture Research
Simon Fraser University
Burnaby, B.C. V5A 1S6
(604) 291-3533

Fisheries & Oceans Canada
Pacific Biological Station
Nanaimo, B.C. V9R 5K6
(604) 756-7148 Ruth Withler
(604) 666-0305 Craig Clarke
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Fisheries & Oceans Canada
Pacific Region
#400-555 W. Hastings
Vancouver, B.C. V6B 5G3
(604) 666-3152

12. FURTHER INFORMATION

Aquaculture Information Bulletins Available
From the Publications Office
Aquaculture and Commercial Fisheries Branch
Ministry of Agriculture and Fisheries
808 Douglas Street, Victoria, B.C., V8W 2Z7

Number	Title
3-2	British Columbia Aquaculture Industry - Update.
7	British Columbia Finfish Aquaculture Inquiry.
8	Federal and Provincial Regulations Regarding the Movement of Fish.
9	Predator Control: The How To's.
10	Guidelines for Selecting Fish Farming Site.
12	Practice and Problems of Salmon Farming in British Columbia in 1986: An On-Farm Survey.
13	Minimizing the Effects of Plankton Blooms on Caged Cultured Fish.
14	The Sechelt Inlet Water Quality Program.
17	The Private Salmon Hatchery Industry in British Columbia
18A	Summary of the 1987 Salmon Farm Survey. Final Report
20	Assessment & Taxation of Aquaculture Operations & Related Benefits
23	1986 Fish Statistics
25	Measures to Ensure Safe Fish Farming in British Columbia